1.0 Management Integration and Control

The Cargo Mission contractor shall provide program and business management, engineering, technical, and administrative skills to accomplish the objectives and outcomes described within this contract. The Cargo Mission contractor shall provide a workforce possessing the knowledge and understanding required to accomplish the work described within this contract. The contractor shall perform the services and deliver the products described in this Statement of Work (SOW), contract terms and conditions, applicable documents, Data Requirements Descriptions (DRDs), and other plans and sections contained within this contract.

1.1 Cargo Mission Management and Administration

The contractor shall conduct management and administration, including risk management to develop and deliver the required products and services as defined within this contract. The contractor shall provide for the planning, organization, control, and reporting of all activities required by this contract.

1.1.1 Cargo Mission Management Plan

The contractor shall develop, update and implement a Cargo Mission Management Plan in accordance with DRD C-PM-01. The contractor shall describe in the plan the contractor's management structure that fully and optimally integrates all related plans and systems, including those of major subcontractors and vendors. (Major subcontractor and vendors are those that exceed $1 Million dollars in annual cost to the prime contractor.) The contractor shall address in the plan the contractor's management of all systems, functions, and data requirements described in this SOW.

1.1.2 Performance Management

Performance management includes defining and reporting metrics that are meaningful to the management of the Cargo Mission.

1.1.2.1 Performance Management Reviews (PMR)

The contractor shall conduct Monthly Performance Management Reviews (PMR) for NASA, and provide integrated management review products in accordance with DRD C-PM-02 for the work performed on this contract. The reviews shall provide the ISS Program insight into the contractor's, subcontractors', and vendors' overall technical, schedule and cost performance. Metrics that indicate the level of success in the execution of contract requirements and the status of the contractor's achievement against the performance standards contained within this statement of work or elsewhere in this contract shall be presented at the PMR. The PMR presentation shall include a correlation of the metrics to the requirements and measurements of management responsiveness to the performance indicated by the metrics. The PMR presentations shall depict performance measurement, accomplishments, issues and corrective actions, company financial status, including rates and all other data necessary to status the ISS Program.

1.1.2.2 Management Information System (MIS) Data Requirements

The Management Information System (MIS) is a web-based data repository designed to keep ISSP management and personnel aware of the most current technical, financial, workforce, schedules,

and operational information, including issues and risks, MIS links ISSP core business issues and goals with the technical aspects of the Program. To accomplish this, ISSP managers will identify contractor provided financial planning, cost, workforce data, schedules, metrics, technical performance and other contractor provided information to be linked to the MIS. The contractor provided information will be a subset of data that is required by the Cargo Mission contract in existing DRDs. NASA will identify data to link to the MIS. The contractor shall link data to the MIS; shall implement the mechanisms for linking this data to the MIS; shall identify and implement changes to the DRDs with contractor defined formats, shall provide compatibility to the MIS; and shall maintain the DRDs electronically in such a manner as to support electronic linkages to the MIS.

1.1.2.3 Contract Close-Out Plan

The contractor shall provide a contract closeout plan in accordance with DRD C-PM-05.

1.1.2.4 Internal and External Reviews

The contractor shall develop briefing materials and analyses from the scope of their work activity for ISSP presentations and meetings with internal and external review groups. These groups include, but are not limited to: the Aerospace Safety Advisory Panel (ASAP), Space Station Utilization Advisory Subcommittee (SSUAS) Stafford and Anfimov, Inspector General (IG) and General Accounting Office (GAO), Space Flight Advisory Committee (SFAC), ISS Management and Cost Evaluation (IMCE) and NASA Advisory Council (NAC), Independent Implementation Review (IIR), and Cost Assessments Teams. The contractor shall develop and deliver materials and analyses, such as ISSP technical, cost, and schedule status, specific safety or risk issues, and responses to external inquiries.

1.2 Business Management

1.2.1 Management and Business Administration

The contractor shall provide overall contract management and administration for this contract. The contractor shall perform all business and administrative functions and integrate these functions across all areas of performance. The contractor's on-going business analysis shall support the ISS Program business process.

1.2.2 Resources Management

The contractor shall perform resource management as defined below.

1.2.1.1 Contract Financial System

The contractor shall provide a contract financial system which discretely tracks resources by Unique Project Number (UPN) source, contract Work Breakdown Structure (WBS), and elements of cost including labor, overhead, other direct costs (i.e. travel and subcontracts), and indirect costs. The contractor shall provide financial planning to the Government budget process (i.e. Program Planning, Budgeting, and Execution (PPBE) budget calls), and special requests for budget impacts.

The contractor shall provide financial reporting in accordance with DRD C-PC-01 NF533 Monthly or Quarterly Cost Reporting. The contractor shall include financial reporting requirements in any subcontracts for all tiers of subcontracts with annual expenditures of $1 Million or more.

1.2.1.2 Performance Measurement System

The contractor shall develop, implement and maintain a Performance Measurement System (PMS) utilizing Cost Performance Reports (CPRs) in accordance with DRD C-PC-02 and Integrated Management Review Product in accordance with DRD C-PM-02. Using the PMS, the contractor shall provide management visibility into all aspects of contractor, interdivisional, subcontractor and vendor activities. The PMS shall be integrated and reconcilable for all management systems and reporting requirements identified within this SOW for the Cargo Mission Contractor and its major subcontractor's.

1.2.1.3 Contract Work Breakdown Structure

The contractor shall develop, provide, and maintain a contract Work Breakdown Structure (WBS) Dictionary, in accordance with DRD C-PC-04 Work Breakdown Structure and Dictionary.

1.2.1.4 Workforce Report

The contractor shall produce Workforce Reports in accordance with DRD C-PC-03 to show organization, geographical breakdown and off-site vs. on site workforce data. The report shall include emergency contacts with locations and phone numbers.

1.2.3 Scheduling

1.2.3.1 Provide Schedules

The contractor shall develop, maintain, and assess top level and lower level resource loaded schedules for the Cargo Mission contract in accordance with DRD C-PC-05. The contractor shall include in the schedules, as a minimum, flight hardware status and interface schedules for: analytical products, ground support equipment, and Government furnished equipment. The contractor shall utilize guidance from SSP 50489 ISS Mission Integration Template in the generation of flight specific schedules. The contractor shall develop and maintain critical path linkages to the Level I and Level II program milestones. The contractor shall identify to the ISSP any schedule milestones within the scope of other ISSP or NASA Center contracts, which affect the performance of the Cargo Mission scope of work.

1.2.3.2 Schedule Data Packages

The contractor shall develop and maintain schedule data packages. The schedule data packages shall include detailed and summary level schedules, integrated cost and schedule metrics charts with risk assessment, logic diagrams, product trees, product descriptions, and schedule analysis products. The contractor shall include analysis that identifies performance to plan and potential schedule impacts with interfacing organizations or contracts. The contractor shall provide daily and weekly updates for tasks defined by NASA and provide monthly updates, analysis and reports for all other tasks.

1.2.3.3 Resolve Impacts and Conflicts

The contractor shall resolve schedule impacts and conflicts identified with interfacing suppliers, next level integrators of flight hardware, analytical products, ground support equipment and Government furnished equipment.

1.2.3.4 Status and IPSP participation

The contractor shall provide schedule performance inputs twice a month to external contractors (non-Cargo Mission Contract contractors) within the Space Station Program. The contractor shall represent the Cargo Mission contract on issues, status, analyses and special agenda topics to the weekly Integrated Program Schedules Panel (IPSP). The contractor shall provide monthly status inputs to Johnson Space Center and Kennedy Space Center organizations.

1.2.3.5 ISS Mission Integration Template

The contractor shall evaluate SSP 50489 ISS Mission Integration Template and recommend updates to reflect changes to the schedule process that occur during the implementation of the cargo integration activities.

1.2.3.6 ISSP Schedules Database

The Program Integration and Control Contract's Schedule Data Management function will utilize an existing schedules database (Common Schedules Database) or develop a new database to contain integrated ISSP schedules data. The Cargo Mission contractor shall participate in development and implementation of Cargo Mission Contract data interfaces to the existing database or to new databases. The contractor shall evaluate ISSP schedule database data to determine data delinquencies and work with data providers to resolve problems.

1.2.3.7 Integrated Risk and Schedule Analysis

The contractor shall perform schedule risk assessments that can be integrated into the overall program schedule risk assessment (ISS Program tool is IRMA (Integrated Risk Management Application)), in order to address overall schedule risk status.

1.2.4 Early Warning System

The contractor shall provide an Early Warning System (EWS) that electronically notifies appropriate contractor and NASA personnel when schedule or cost performance indices exceed predefined variance thresholds.

1.3 Configuration and Data Management and Integration

1.3.1 Configuration Management (CM)

The contractor shall develop, implement and administer configuration management operations as specified in this contract and in accordance with SSP 41170 ISS Program Configuration Management Requirements, SSP 50010 Standards for ISS Program Documentation, SSP 50123 Configuration Management Handbook, and SSP 50172 Data Management Handbook. Additionally, the contractor shall be responsible for contract specific CM functions as described in each of the functional CM areas described below.

1.3.1.1 Management and Administration

The contractor shall develop a configuration management plan in accordance with DRD CMC-CM-01. The contractor shall administer the ISSP Configuration Management (CM) and Data Management (DM) requirements for the Cargo Mission Contract in accordance with the contractor's CM Plan (DRD C-CM-01). The contractor shall develop, status, and maintain CM metrics that effectively indicate the quantity, type, and status of the work.

1.3.1.2 Configuration Baselines

The contractor shall identify, establish, maintain and transfer Cargo Mission Contract hardware product baselines to NASA per DRD C-CM-02 in accordance with SSP 41170.

1.3.1.3 Configuration Status Accounting and Verification

The Contractor shall implement Configuration Status Accounting and Configuration Verification requirements in accordance with SSP 41170 for CMC hardware products. This includes processes and provisions for reports or access to CSA data. The contractor shall ensure that historical configuration data is properly retained. The contractor shall reconcile the CSA data with operational procedures, drawings, modifications, and manifests.

1.3.1.3.1 Mission Support

The contractor shall provide configuration management support for anomaly resolution process as required in paragraph 3.1.1.

1.3.1.3.2 Compliance Audits

The contractor shall participate in audits of compliance with Configuration Management requirements in accordance with SSP 41170 and processes by providing access to personnel, facilities and data.

1.3.1.4 Configuration Control and Change Management

1.3.1.4.1 Change Processing

The contractor shall process changes specific to the Cargo Mission Contract in accordance with SSP 50123 Configuration Management Handbook.

1.3.1.4.2 Review of Change Notices and Change Requests

The contractor shall coordinate, review, and assess all Space Station Change Notices (SSCNs) and Change Requests (CRs) that apply to the flight hardware and operations within the scope of this SOW or when requested by the Government in accordance with SSP 50123.

1.3.1.4.3 Configuration Status Management Operations System (COSMOS)

The contractor shall input, maintain, and validate the COSMOS database to assign Change Requests (CRs) numbers, track and status changes, and provide accurate information, reports, and monthly

metrics for CRs initiated by the Cargo Mission contractor or being evaluated by the Cargo Mission contractor.

1.3.2 Data Management

The contractor shall perform the following Data Management activities to this contract in accordance with SSP 41170 Configuration Management Requirements, SSP 50010 Standards for ISS Program Documentation, and SSP 50172 Data Management Handbook.

1.3.2.1 Engineering Release Unit (ERU)

The contractor shall provide an electronic Engineering Release Unit (ERU) to load copies of documentation or drawings to an official repository and file the hardcopy in accordance with SSP 41170 and SSP 50172 for release of ISS Program baseline documentation.

1.3.2.2 Vehicle Master Database (VMDB)

For all engineering drawings and associated engineering products that are delivered to NASA, or to NASA contractors, the contractor shall also transmit them to the Vehicle Master Database (VMDB) in accordance with ISS Vehicle Engineering Data DRD C-MI-04.

1.3.2.3 Electronic Document Management System (EDMS)

The Contractor shall upload the ISS Program technical documentation baseline within this SOW into EDMS in accordance with SSP 41170 and SSP 50123.

1.3.2.4 Change Management Receipt Desk

The contractor shall operate a Configuration Management Receipt Desk (CMRD) to exchange configuration management documentation with other contractors or NASA centers in accordance with SSP 50123 and SSP 50172.

1.3.2.5 Document Quality Assurance

The contractor shall provide Document Quality Assurance (DQA) in accordance with SSP 50010 and SSP 50172 for all ISS Program controlled documentation identified in this contract.

1.3.3 Data Integration

1.3.3.1 Data Workflow Processes

The contractor shall provide the technical content and expertise to the ISSP Program Data Integration Team to identify and document data workflow processes associated with the Cargo Mission contract that impact work performance of other ISSP contracts. This includes providing support to data related meetings to share information on Cargo Mission interfaces, responding to written or verbal questions, and providing evaluations and recommendations for potential process improvements.

1.4 Program Information Technology (IT)

The Contractor shall provide the IT tools and support that are necessary to perform the requirements as stated in the contract, in accordance with SSP 50013 ISS Information Systems Plan. The Contractor may choose to utilize the ISS Program IT infrastructure provided by the Program Integration and Control (PI&C) Contract when common products and services provide for increased supportability, commonality, or efficiencies.

Desktop computers and workstation support for on-site personnel will be provided by NASA, through institutional Center or Agency IT services contracts, in accordance with NFS 1852.245-77 and Mission Focus Review (MFR) 137. Through a NASA Contractor, NASA will provide the ISS Program with standard office desktop workstation hardware and a standard software load for the provided hardware. NASA will be responsible for support and asset management of all NASA-provided desktop computer hardware and software.

The Contractor shall obtain system administrator access as necessary from the NASA Contractor to support ISS Program-specific hardware and software requirements on NASA-provided desktops and workstations. The Contractor shall coordinate any depot maintenance of NASA-provided IT hardware with the appropriate NASA Contractor.

1.4.1 Information Technology Management

All of the existing ISS Program IT tools defined in Appendix ZZZ are available as Government Furnished Software which may be utilized by the Contractor to fulfill contract requirements.

1.4.1.1 If the Contractor implements a Public Key Infrastructure (PKI) system, the Contractor system shall be interoperable with the NASA PKI system.

1.4.1.2 The Contractor shall implement an architecture that enables bi-directional digital data sharing with Government representatives within the JSC and KSC networks. Access to the JSC networks is managed through the JSC Network Access Control Board (NACB). Access to the KSC networks is managed by the KSC Chief Information Officer (CIO) or designee.

1.4.2 Systems Management and Operations

The Contractor shall ensure that all Contractor-managed IT systems are performing efficiently within their defined life cycles in accordance with NASA requirements, including Safety and IT Security, as well as industry best practices and applicable standards.

1.4.2.1 Life Cycle Management

The Contractor shall adhere to policies and standards, and support information exchange and decision making forums in accordance with SSP 50013.

1.4.2.2 Security Support

1.4.2.2.1 The Contractor shall assume responsibility for maintaining existing IT System Security Plans for Contractor-managed IT systems.

1.4.2.2.2 Response to IT Security Issues and Incidents

The Contractor shall report, investigate and process to closure all IT security incidents in accordance with NPR 2810.1A and other applicable NASA requirements and directives. The Contractor shall also notify the local Center Information Technology Security Manager (ITSM), ISS Program Organization Computer Security Official (OCSO) and ISS Program IT Lead of all IT security incidents.

The Contractor shall process security-related incidents including but not limited to; identifying network attacks, identifying and analyzing cases of misuse of IT resources, securing computing resources as required, and providing 24-hour response to computer security incidents and notification of appropriate personnel.

The Contractor shall provide analysis of security incidents relating to misuse of IT resources or incorrectly configured systems, securing computing resources as required or working with system owners to properly reconfigure affected systems.

1.4.2.2.3 Certification and Accreditation Packages and Related Documentation

Major re-certifications of IT Systems requiring Certification and Accreditation (C&A) occur every three years, and the Contractor shall prepare for and support this activity to ensure successful system re-certification.

The Contractor shall update and maintain existing C&A packages in accordance with DRD CMC-IT-01. In addition, the Contractor shall develop, update and maintain C&A packages for any offsite facilities that contain or process NASA data in accordance with DRD CMC-IT-01 Section 8(II).

1.4.3 Virtual Enterprise System

The contractor shall maintain and operate the existing CMC Virtual Enterprise System (CVES) web site at contract start. The CVES provides a consolidated and integrated information system which provides electronic data, including status information, schedules, documentation, meeting presentations and minutes, action items and program processes for the cargo integration scope of this contract. The Contractor shall assess the value of adding FCE information to the CVES web site.

1.5 Certification of Flight Readiness

The contractor shall develop, update and implement a Certification of Flight Readiness (CoFR) Plan covering all hardware and operations in the SOW, in accordance with DRD C-MI-01. The CoFR Plan shall be in accordance with SSP 50108, Certification of Flight Readiness for ISS. The contractor shall monitor and report certification status of items at the manifest indenture level. The contractor shall develop and implement an auditable approach to verify and ensure that flight preparation responsibilities and requirements are met and all problems dispositioned in accordance with SSP 50108.

1.6 Export Control

The contractor shall provide export control functions for all hardware, software and data requiring export in the execution of contract responsibilities. The contractor shall establish export control procedures that are compliant with applicable Department of Commerce and Department of State

regulations and perform self-audits of their established export control procedures per DRD C-II-01 and SSP 50223.

1.7 Reviews

The contractor shall contribute to program reviews, control boards and panels, working groups, Technical Interchange Meetings, including all internal International Partners (IPs), customers, and Government reviews leading up to the formal review or board meeting, as required by this SOW and as listed in Attachment J-1 SOW, Appendix 12, Review Support Matrix.

2.0 Safety and Mission Assurance (S&MA)

2.1 S&MA Management

The contractor shall develop, maintain, and implement a Mission Assurance and Risk Management (MA&RM) Plan in accordance with DRD C-SA-01. The MA&RM plan shall contain S&MA Management, Risk Management, ISS Safety Program, Reliability and Maintainability, Quality Assurance and Operations Safety.

2.1.1 Risk Management

The contractor shall identify risks and coordinate the abatement or acceptance of these risks with NASA counterparts. The contractor shall input risks into the ISSP risk process in accordance with SSP 50175 Risk Management Plan and Joint Program Directive (JPD) 306 Establishment of the Program Risk Management System.

2.1.2 ISS Safety Program

2.1.2.1 ISS System Safety Assessment

The contractor shall perform and deliver safety assessments for all contractor sustained hardware and software and ground test equipment in accordance with NPR 8715.3 NASA General Safety Program Requirements; SSP 30599 Safety Review Process; SSP 30309 Safety Analysis and Risk Assessment Requirements; SSP 50021 Safety Requirements Document; and Hazards Reports and System Description (DRD C-SA-06). The contractor shall participate in safety reviews, ISSP Boards, and working groups to obtain ISS Program approval.

2.1.2.2 Integrated Cargo Hazard Analysis

The contractor shall perform Integrated Cargo Hazard Analysis in accordance with SSP 30599 Safety Review Process and SSP 51700 Payload Safety Requirements for cargo integrated within this contract for the ground processing, launch, and return phases of the integrated cargo using Hazards Reports and System Description (DRD C-SA-06). The contractor shall participate in safety reviews, ISSP boards, and working groups as required.

2.1.2.3 Safety Requirement Verification

The contractor shall perform safety requirement verification planning for any new contractor developed hardware and software, including any ground test equipment. The contractor shall

perform verification analyses, test, and inspection to certify compliance to the Safety requirements as defined in SOW paragraph 2.1.2. The contractor shall deliver requirement documentation, verification planning sheets (VPSs), verification compliance notices (VCNs), and supporting documentation in accordance with Hazards Reports and System Description (DRD C-SA-06).

2.1.3 Reliability and Maintainability (R&M)

2.1.3.1 Failure Modes and Effects Analysis and Critical Items List (FMEA and CIL)

The contractor shall develop, maintain and deliver the FMEA and CIL Report and FMEA and CIL worksheets in accordance with SSP 30234 Failure Modes and Effects Analysis and Critical Items List Requirements for Space Station and DRD C-SA-10. All FMEAs and CILs for hardware either sustained or developed under this contract shall be submitted to NASA R&M for review and approval. When required the contractor shall present critical items to the SSPCB for approval.

2.1.3.2 R&M Data and Analyses

The contractor shall develop, and deliver the R&M Allocation, Assessment, and Analysis (AAA) Report in accordance with DRD C-SA-08. The contractor shall maintain hardware R&M source data to reflect operational performance. The contractor shall utilize baselined reliability block diagrams and data to perform quantitative R&M analyses. The contractor shall submit newly generated or updated source data and analyses to NASA R&M for approval.

2.1.3.3.1 R&M Requirement Verification

The contractor shall perform R&M Verification planning and deliver R&M Verification Planning Sheets, Verification Logic Networks, and Verification Compliance Notices in support of R&M design requirement verification for new hardware development and certification.

2.1.4 Quality Assurance

2.1.4.1 Quality Assurance Plan

The contractor shall develop, implement and maintain a quality assurance plan, as documented in the Mission Assurance & Risk Management (MA & RM) Plan per DRD C-SA-01 in accordance with SSP 41173 Space Station Quality Assurance Requirements.

2.1.4.2 GIDEP and NASA Advisory Problem Data Sharing and Utilization Program Documentation and Reporting

The contractor shall be a member of and participate in the Government-Industry Data Exchange Program (GIDEP) in accordance with the requirements of the GIDEP S0300-BT-PRO-010 and S0300-BU-GYD-010, available from the GIDEP Operations Center, PO Box 8000, Corona, California 92878-8000. The contractor shall review all GIDEP ALERTS, SAFE-ALERTS, Problem Advisories, Agency Action Notices, and NASA Advisories to determine if they affect the contractor's products and services provided to NASA. For those that affect the program, the contractor shall take action to eliminate or mitigate any negative effect to an acceptable level. The contractor shall generate the appropriate failure experience GIDEP data report(s) (ALERT, SAFE-ALERT, and Problem Advisory) and initiate a NASA Advisory on JSC Form 1159 in accordance

with NPR 8735.1, whenever failed or nonconforming items, available to other buyers, are discovered during the course of the contract.

2.1.4.3 Problem Reporting System

The contractor shall develop and implement a reporting system in compliance with the requirements of SSP 41173 Space Station Quality Assurance Requirements. The contractor shall report, promote and participate in the investigation and resolution of applicable problems in accordance with SSP 41173, SSP 30524 Problem Reporting and Corrective Action (PRACA) Data System Requirements Document, and SSP 30223 International Space Station Problem Reporting and Corrective Action (PRACA) System Requirements.

2.1.4.4 Hardware Acceptance

The contractor shall provide an Acceptance Data Package (ADP) for contractor developed hardware. The contractor shall maintain and provide the ADP for sustained hardware, as a result of implementing NASA approved changes, such as hardware processing, refurbishment, repair and design upgrades. The contractor shall complete work, document open actions and closure, and maintain ADPs in accordance with SSP 50287 Hardware/Software Acceptance Process, SSP 41173, and SSP 50010 Standards for ISS Program Documentation, and SSP 30695 Acceptance Data Package Requirements Specification.

2.1.5 Operations Safety

The contractor shall participate in the anomaly resolution process in accordance with MGT–OA-018 ISS System Problem Resolution Team (SPRT) Work Instruction and MGT-OA-019 On-Orbit Anomaly Resolution Process Work Instruction (ref 3.1.1).

2.2 AS 9100

The contractor shall establish and maintain a Quality Management System (QMS) that complies with the Society of Automotive Engineers Aerospace Standard AS 9100 Rev C Quality Management Systems – Requirements for Aviation, Space and Defense Organizations. Third party certification and registration is not required at contract award; however, the contractor must be certified by third party audit within 18 months of contract award. If the contractor is AS 9100 registered and subsequently changes registrars, loses registration status, or is put on notice of losing registration status, the contractor shall notify the NASA Contracting Officer within three (3) working days of receiving such notice from the registrar.

2.3 Audit and Surveillance

The contractor shall provide access to data, personnel, and facilities for Government audit or surveillance of contractor plans, procedures, and processes when deemed necessary by the Government. The contractor shall provide written responses to audit or surveillance findings that are delivered to and accepted by the Government.

2.4 Mishap Investigating and Reporting

The contractor shall investigate and report mishaps, in accordance with NPR 8621.1, NASA Procedural Requirements for Mishap and Close Call Reporting, Investigating, and Recordkeeping

and NPR 8715.3, NASA General Safety Program Requirements. All investigation reports shall include a human factors assessment, root cause analysis and any remedial or corrective actions performed. These reports shall encompass mishaps occurring during the contracted period as follows:

- All mission failures and type A and B mishaps resulting in injury to contractor personnel or equipment damage occurring onsite at NASA facilities and offsite at contractor facilities.
- Type C mishaps resulting in equipment damage onsite at NASA facilities and offsite at contractor facilities, or injury to contractor personnel located onsite at NASA facilities.
- Incidents and close calls occurring onsite at NASA facilities.

The contractor shall develop and implement a call tree with Government contacts for the reporting of a mishap, near-miss incident, equipment problem or a system going out of specification. The contractor shall report incidents and problems within four hours of the occurrence. Type C injury mishaps occurring offsite at contractor facilities shall be reported in a monthly summary of such injuries. The contractor shall enter mishap reporting and provide summary data on mishaps into the Incident Reporting Information System (IRIS) per NPR 8621.1.

2.5 Safety and Health

The contractor shall develop and implement a process to identify how personnel and property will be protected from injury or harm and ensure the safety of all working conditions throughout the performance of the contract. The process shall provide for hazardous operation surveillance, hazardous procedure review, and risk assessments associated with deviations from procedures or safety and health requirements. The contractor shall comply with NASA installation safety and health requirements and related processes when performing contract work onsite at NASA installations. The contractor shall develop, implement and maintain a Safety and Health (S&H) Plan in accordance with DRD C-SA-02. The contractor shall document the assessments in monthly safety and health metrics per DRD C-SA-03 and perform an annual safety and health program self-evaluation per DRD C-SA-04.

2.6 Lessons Learned

The contractor shall develop, update and implement a process to capture, disseminate, and implement mishap related lessons learned, both positive and negative, in accordance with NPR 8621.1, NASA Procedural Requirements for Mishap and Close Call Reporting, Investing, and Recordkeeping. For non-mishap related lessons learned, the contractor shall meet NPR 7120.6 Lesson Learned Process and enter the lessons learned into the Government provided database in accordance with JPR 2310.1 JSC Organizational Learning Process.

3.0 Hardware Requirements

The contractor shall have a capability to design or manufacture flight and training hardware, including but not limited to Flight Support Equipment (FSE), stowage accommodations, On-orbit Support Equipment (OSE), and Flight Crew Equipment (FCE). The contractor shall also design and sustain mockups, Special Test Equipment (STE), Factory Equipment (FE), and Ground Support Equipment (GSE) if needed. The contractor shall also provide sustaining engineering for the FCE and stowage accommodations for items included in Appendix XX.

3.1 Common Requirements

This section contains requirements that are applicable to both hardware development and sustaining engineering.

3.1.1 Anomaly Resolution

The contractor shall identify, investigate, resolve, and document flight and ground hardware anomalies for all hardware sustained by this contract.

3.1.1.1 Applicable anomalies shall be documented per SSP 30223, Problem Reporting and Corrective Action (PRACA) for the Space Station Program per section 2.1.4.3 of this SOW.

3.1.1.2 The contractor shall support NASA in the dispositions of problem reports for hardware sustained on this contract.

3.1.1.3 The contractor shall conduct anomaly resolution in accordance with MGT–OA-018 ISS System Problem Resolution Team (SPRT) Work Instruction and MGT-OA-019, On-Orbit Anomaly Resolution Process Work Instruction.

3.1.2 Work Authorization Documents

The contractor shall review work authorization documents (WADs) that contain first time operations, or implement modifications affecting hardware and operations within the scope of this contract.

3.1.3 Engineering Drawings, Data and CAD Models

The contractor shall generate and manage engineering drawings, data, and Computer Aided Design (CAD) models as described below.

3.1.3.1 Engineering Drawings and Data

Drawings shall be developed in accordance with ASME Y14.100, Engineering Drawing Practices; ASME Y14.24M, Types and Applications of Engineering Drawings; ASME Y14.34M Associated Lists; and ASME Y14.35M, Revision of Engineering Drawings and Associated Documents; and DRD C-MI-05, Engineering Drawings and Associated Lists. The contractor shall release engineering drawings per paragraph 1.3.2.1 and deliver to the VMDB per paragraph 1.3.2.2.

3.1.3.2 CAD Models

The Cargo Mission contractor shall deliver all CAD models developed under the Cargo Mission Contract to the USOS Acceptance and ISS Vehicle Sustaining Contractor to maintain in a model library in accordance with Cargo Integration Cargo CAD Models for Launch, Return and On-orbit Configurations DRD C-MI-03.

3.2 Hardware Development and Manufacturing

The contractor shall have a capability to design, manufacture, assemble and certify flight hardware, including but not limited to FSE, stowage accommodations, OSE, and FCE. The contractor shall also design mockups, STE, FE, and GSE if needed.

3.2.1 Design and Manufacturing Requirements

Contractor designed or manufactured flight and training hardware, FSE, stowage accommodations, OSE, FCE, STE, FE, and GSE shall comply with all applicable design standards including but not limited to the following:

SSP 50835 ISS Pressurized Volume Hardware Common Interface Requirements Document (CIRD)
SSP 50492 General ISS On-orbit Requirements for Non-Pressurized Support Equipment
SSP 50021 Safety Requirements Document
SSP 50004 Ground Support Equipment Design Requirements International Space Station;
JSC 27472 Requirements For Submission Of Data Needed For Toxicological Assessment Of Chemicals and Biologicals To Be Flown On Manned Spacecraft.
DX12-0013, Neutral Buoyancy Laboratory Mockup Requirements
JSC-28528 Mockup Design and Requirements Document
NPR 6000.1 Requirements for Packaging, Handling and Transportation for Aeronautical and Space Systems, Equipment, and Associated Components

3.2.2 Manufacturing and Assembly

The contractor shall have the capability or be able to acquire the capability to manufacture and assemble flight or ground hardware goods in accordance with SSP 50276 Depot Manufacturing Facility Certification Plan.

3.2.3 Hardware and Data Deliveries

For each end item being designed or built, the contractor shall deliver the corresponding data and hardware in accordance with SSP 50287 and DRD XYZ.

3.2.3.1 Acceptance Data Package

For contractor provided flight and ground hardware, the contractor shall deliver an ADP as defined in paragraph 2.1.4.4.

3.2.3.2 Bar code and Labeling

The contractor shall bar code and label new hardware manufactured by the contractor in accordance with SSP 50005 Flight Crew Integration Standard (NASA-STD-3000/T) and SSP 50007 ISS Inventory Management System Bar Code Label Requirements and Specification.

3.2.4 Safety & Reliability Assessments

The contractor shall perform and deliver safety assessments and FMEA/CIL worksheets in accordance with paragraphs 2.1.2 and 2.1.3, respectively, for new contractor developed hardware and software, including any ground test equipment.

3.3 Hardware Sustaining

The contractor shall perform sustaining engineering services, as defined in this SOW.

3.3.1 Maintenance and Operations (M&O)

3.3.1.1 FCE/ and Stowage Accommodations Inventory Management

The contractor shall warehouse, procure, maintain, allocate, issue and track all FCE and stowage accommodations identified in Appendix XYZ.

3.3.1.1.1 Inventory Management

The contractor shall maintain a current inventory of all FCE and stowage accommodations by location with location identified as "on ISS", "on a transportation vehicle (and identify the transportation vehicle)", or "on the ground". For items identified as “on the ground” the contractor shall identify the location and status, e.g. “warehouse”, “shipped to training facility”, “under repair”, “staged at launch site for contingency use”. The contractor shall submit to NASA an Equipment Inventory Report which provides visibility of the inventory of material, parts, subassemblies, and end items (DR 1.4.9-f).

3.3.1.1.2 Bench Review Support

The contractor shall ensure sufficient quantities of FCE (e.g. crew provisioning items) and stowage accommodations are available for use during packing operations and for crew preference requirements at bench reviews in addition to the quantities listed in SSP 541PP-ANX1, Increment Definition and Requirements Document for Planning Period PP, Annex 1. The contractor shall establish and document equivalency of items procured.

3.3.1.1.3 Label Inventory and Tracking

The Contractor shall determine and maintain a sufficient quantity of IMS barcode and nomenclature labels at the packing facility for contingency labeling to complete hardware readiness as instructed by ISS Program or hardware provider. The Contractor shall track shelf and limited life of labels as defined in SSP 50005 and SSP 50007.

3.3.1.2 Processing of Flight and Training Hardware

The contractor shall perform any processing required to make the hardware identified in Appendix XXX ready for flight or training use when requested by the Government. The contractor shall update required technical documentation including acceptance data packages.

3.3.1.3 Maintenance and Repair of Hardware and Soft Goods

The contractor shall perform maintenance, repair and acceptance testing of the hardware identified in Appendix XXX. The contractor shall update required technical documentation including acceptance data packages. The contractor shall provide certified repair of hardware and soft goods in accordance with SSP 50276 Depot and Manufacturing Facility Certification Plan.

The contractor shall perform minor hardware repairs on behalf of hardware providers (including GFE) when requested by the Government in support of Hardware Verification Review or Bench Reviews.

3.3.1.3.1 Standard Repair Procedures

The contractor shall generate, review and approve standard repair procedures (SRPs) affecting hardware within the sustaining engineering responsibility of the Cargo Mission Contract when an SRP does not already exist. Existing SRP's that are applicable to the sustaining engineering responsibilities of this contract include are included in Appendix YY.

3.3.1.4 Materials Identification Usage List (MIUL)

The contractor shall maintain a MIUL and when applicable, provide material usage agreements (MUAs), in accordance with SSP 30233, Space Station Materials and Processes for hardware sustained by this contract.

3.3.1.5 Hardware Certification Tracking

The contractor shall review all subsystem processing procedure changes, engineering drawing changes, and Material Review Board (MRB) dispositions to determine if they impact certification of hardware within the scope of this contract.

3.3.2 Hardware Performance Analysis

The contractor shall monitor, analyze, and document hardware reliability and performance to determine actual versus expected performance, anomalous behavior, and required updates to repair, maintenance plans, check out plans, and operational procedures. The contractor shall coordinate identified issues which may impact other hardware providers.

3.3.3 Design Support

3.3.3.1 Design Engineering Support to Logistics and Maintenance

The contractor shall provide design engineering requirements, concurrence on work authorization documents, and technical support to all logistics and maintenance activities associated with the hardware sustained by this contract as identified in Appendix YY.

3.3.3.2 Design Engineering Support to Other Organizations and Projects

The contractor shall provide design engineering input, requirements (to include procedures and constraints), analyses, special test servicing or factory equipment, and decision making inputs to the launch and processing sites' integration and de-integration activities to perform pre-flight and post-flight processing and servicing, pad and launch operations, hardware assembly, test, and issue resolution. For new stowage hardware projects that are initiated by the Government after the start of the Cargo Mission Contract, the Contractor shall provide stowage engineering lessons learned and innovations during the development process and shall participate in stowage hardware requirement definition, design, development, and integration reviews.

3.3.4 Modifications to Existing Hardware

The contractor shall provide engineering products (engineering drawings, reports, engineering data, Time Compliance Technical Instructions (TCTI), and procurement of long lead items), modification kits, engineering support, and updates to the Acceptance Data Packages for Government approved modifications to existing flight hardware, as directed by the Government. The modification shall be performed in accordance with SSP 41170 and DRD C-SA-11.

4.0 Pressurized Cargo Integration

The Contractor shall perform Pressurized Cargo Integration functions for pressurized cargo as outlined in this SOW. The Cargo Coordination function provides determination of packing location of NASA manifested cargo and accountability for the processing of identified NASA packed cargo through the stowage integration and physical integration processes,. The Stowage Integration function performs assessments and mission specific cargo configuration layouts and products for passive cargo stowage into bags, trays and other specialized stowage accommodations for NASA pre-packed cargo. The Physical Integration function includes all tasks required for physical processing of NASA pre-packed cargo and delivery of packed soft stowage bags or ORUs to the Next Level Integrator (NLI). Descriptions of cargo integration processes are provided in SSP 50200-01, Station Program Implementation Plan Volume 1: Station Program Management Plan; SSP 50200-03 and SSP 50200-06.

Unless otherwise specified, tasks outlined in this section apply to NASA pre-packed ISS cargo for all visiting vehicles, including Soyuz, Progress, ATV, HTV, all commercial Cargo Resupply Services (CRS) providers, and the Constellation Program (CxP) Crew Exploration Vehicle (CEV).

The Contractor shall accomplish all tasks contained in this SOW in accordance with the following applicable Program documents:

- SSP 54100, Increment Definition and Requirements Document Flight Program,
- SSP 541PP, Increment Definition and Requirements Document for Planning Period (IDRD PP) where "PP" indicates the Planning Period number;
- SSP 541PP-ANX 1 Annex 1, Increment Definition and Requirements Document for Planning Period, Annex 1 Manifest, and the interim weekly updates;
- SSP 50502, International Space Station Hardware Preflight Imagery Requirements;
- SSP 50521, Return, Processing, Distribution and Archiving of Imagery Products from the International Space Station, section 5;
- SSP 50647, Mission Integration Database Applications System (MIDAS) to CIDMT ICD for ATV;
- SSP 50489, MIDAS to JAXA HTV Cargo Integration System ICD;
- SSP 50261-01, Generic Ground rules, Requirements and Constraints Part 1: Strategic and Tactical Planning;
- SSP 50273, Segment Specification for the H-II Transfer Vehicle;
- SSP 50438, International Space Station to H-II Transfer Vehicle Interface Control Document Part 1;
- SSP 50489, Mission Integration Templates;

- SSP 50808, International Space Station to Commercial Orbital Transportation Services (COTS) Interface Requirements Document;
- SSP 50833, International Space Station Program Cargo Transport Interface Requirements Document;
- SSP 50XXX-XX, Mission Integration and Operations Management Plan (MIOMP);
- SSP 50XXX, Interface Definition Document (IDD) for Dragon; and
- SSP 50XXX, IDD for Cygnus.

The above documents provide the ISS Program implementation direction for the Cargo Mission Contract. The Contractor shall provide inputs back to the ISS Program for discrepancies found in the above listed documents.

The following IP controlled documents are available for reference when performing the bag-level integration function for NASA cargo launching in IP vehicles. The contractor shall notify the Government if compliance with any requirements in these documents conflicts with the prescribed tasks in this SOW:

- OPS-IDD0-200, ATV Cargo Integration IDD;
- NASDA-ESPC-2857, HTV Cargo Standard Interface Requirements Document Part 1;
- JFX-99102, HTV Cargo Accommodation Handbook; and
- JFX-20090175, HTV Cargo Integration Plan (CIP)

4.1 Cargo Mission Planning

The MIC Contractor performs tactical level assessments covering two-year horizons and a continuous activity for execute-level assessments of requirements. The Contractor for this Cargo Mission Contract shall provide tactical level assessments of manifests and manifest options to the MIC Contract, when requested by the ISS Program, for the integration of these assessments into the overall ISS Program planning process. Descriptions of the tactical planning processes are defined in SSP 50200-01 and SSP 50200-02, Station Program Implementation Plan Volume 2: Program Planning and Manifesting.

4.1.1 Tactical Planning Support

4.1.1.1 Manifest Assessments

The Contractor shall provide assessments of manifests and manifest options, including but not limited to the following types of analyses and data, when requested by ISS Program:

a. Effect of the Contractor's processing plans and schedules on interfacing suppliers and next level integrators of flight hardware analytical products, ground support equipment and Government Furnished Equipment (GFE);

b. Use plans for Contractor owned and Government furnished facilities and equipment;

c. Optimization assessments;

d. Cargo mass properties and stowage requirement assessments;

e. Fleet (Flight Support Equipment [FSE], Orbital Support Equipment [OSE] and Ground Support Equipment [GSE]) resource assessments for hardware under responsibility of the Cargo Mission contractor;

f. Late cargo integration assessments;

g. Special studies and recommendations to programmatic issues and actions affecting cargo integration and processing templates or processes.

4.1.1.2 Launch Package and Increment Management Teams

The Contractor shall participate as a member of the NASA-contractor Launch Package Teams (LPTs) and Increment Management Teams (IMTs) in the performance of the pressurized cargo integration activities within the scope of this SOW. These teams are described in SSP 50200-01. The relationships of the Cargo Mission Contract to the LPTs and IMTs are also described in SSP 50200-03.

4.1.1.3 Crew Debriefs

The Contractor shall participate in Expedition Crew on-orbit and post-flight debriefs addressing pressurized cargo, including the submittal of questions, attendance at appropriate debrief sessions, and delivery of written synopses of pressurized cargo debrief results to the NASA Cargo Integration Office, Increment Management Team, and Launch Package Team.

4.1.2 NASA Cargo Integration Office Support

4.1.2.1 Cargo Mission and Processes Documentation: The Contractor shall book coordinate, as defined in Attachment J-1: Appendix 1 Dictionary, the following program process and requirements documents:

- JSC 39207G, Certification and Acceptance Requirements Document for the Cargo Transfer Bag (CTB),
- JSC 39233E, Interface Definition Document (IDD) for the International Space Station Cargo Transfer Bag (CTB),
- SSP 50007, Space Station Inventory Management System Label Specification,
- SSP 50200-03, Station Program Implementation Plan (SPIP), Volume 3: Cargo Analytical Integration,
- SSP 50200-06, Station Program Implementation Plan (SPIP), Volume 6: Cargo Physical Processing,
- SSP 50432, ISS Cargo Transfer Bag Specification,
- SSP 50465, Return Manifest Disposition Plan (RMDP) Blank Book, including flight specific appendices (i.e., Appendix D (team rosters), Appendix E (RMDP flight appendix), Appendix F (As-Flown RMDP) and Appendix G (Excess Integration and Unplanned Hardware) to be delivered using MIDAS RMDP application.

The Contractor shall recommend process improvements to SSP 50200-03 and SSP 50200-06 and deliver recommended revisions when requested by the Government.

The Cargo Mission Contractor shall assess and provide impacts to change requests affecting JSC 27260, Decal Process Document and Catalog.

4.1.2.2 Visiting Vehicle Cargo Element Process Improvement

The Contractor shall provide recommendations and information to the NASA Cargo Integration Office and to the International Partners (IPs), CRS providers and CxP to support continuous improvement of their cargo element integration processes for their vehicles.

4.1.3 Cargo Mission Schedules

The Contractor shall use SSP 50489 as a reference to determine template delivery dates for products and support MIC development of Cargo Mission flight specific Performance-to-Plan (PTP) and Level III schedules for the Launch Package Team.

4.2 Cargo Coordination

The Contractor shall perform the cargo coordination function, as described in SSP 50200-06 for all ISS cargo flown on CRS and CxP vehicles and for NASA cargo flown on IP vehicles. The Contractor shall perform as the facilitator for identification and resolution of all issues and concerns related to cargo integration tasks for the cargo element, integration of schedules and deliverables with the hardware providers, next level integrators and product customers.

4.2.1 Determine Physical Integration Location

4.2.1.1 IP and Mixed NASA and IP Hardware

The Contractor shall assess and recommend to the Government the optimal location of the physical integration of all NASA pressurized cargo identified for IP flights and coordinate with IP's regarding resolution of "mixed" NASA and IP packed bags and lockers. The Contractor shall provide physical integration data in an electronic format to the MIDAS manifesting system implemented by the MIC. The Contractor shall update previously provided information as physical integration or integrator locations are modified or updated manifest data provided.

4.2.2 Hardware Data Validation and Tracking

4.2.2.1 Requirements focal point

For all hardware processed through this SOW, the Contractor shall be the focal point for communicating ISS Program requirements, obtaining hardware requirements from hardware provider points of contact and documenting information in MIDAS, Action Tracking Accountability (ATA) or equivalent databases. If requirements cannot be met, the Contractor shall coordinate resolution with the hardware provider. Discrepancies that cannot be resolved shall be coordinated with the Mission Integration Contractor and the Launch Package Manager. For Payload hardware, the Stowage Payload Integration Manager (SPIM) is the point of contact for payload hardware and not the individual payload hardware providers.

4.2.2.2 Hardware Tracking

The Cargo Mission Contractor shall use the MIDAS Cargo Priority List (CPL) report and weekly interim manifest updates as the flight specific source for the list of cargo to be processed under the Cargo Mission Contract. For the generation of reports required by the Cargo Mission Contract, the Contractor shall use MIDAS or an equivalent MIDAS interface compatible, software system.

4.2.2.3 Hardware Reporting

The Contractor shall provide hardware reporting for the cargo integration data fields in MIDAS and provide hardware readiness and delivery tracking reports to the Launch Package Team, NASA Cargo Integration Manager, and Daily Space Station Review Board (DSSR).

4.2.2.4 Data Validation, Update and Transfer

The Contractor shall validate and update cargo integration data fields in MIDAS for all NASA pre-packed cargo (reference SSP 50647 for cargo launching on ATV and SSP 50489 for cargo launching on HTV).

4.2.2.5 Hardware Audit

For all hardware packed within the scope of this contract, the Contractor shall coordinate and conduct a flight specific hardware audit to verify hardware is certified and ready for flight and to verify manifest data. The Contractor will provide a Hardware Accountability Matrix Report (HAMR) per DRD xxx.

4.2.2.6 Hardware Action Tracking

The Contractor shall record and track actions identified at the hardware audit, hardware verification reviews, bench reviews or other cargo coordination events until action closure using ATA system or equivalent system. The Contractor shall report open action status at LPM IPT meetings.

4.2.3 Cargo Scheduling

4.2.3.1 Hardware Delivery Scheduling

The Contractor shall coordinate hardware delivery dates with the hardware providers for items manifested on a given mission. The delivery dates will be scheduled such that they support agreed-to cargo turnover dates with the next level integrator. When schedule issues arise that cannot be resolved, the Contractor shall notify the NASA Launch Package Manager to initiate negotiations with the hardware provider.

4.2.3.2 Bench Review Scheduling

The Contractor shall coordinate bench review dates with the hardware providers, Launch Package Team, Flight Crew representatives, next level integrators and other personnel participating in the bench review. The Bench Review milestone(s) for a given mission will be scheduled such that they support agreed-to cargo turnover dates with the next level integrator. When schedule issues arise that cannot be resolved, the Contractor shall notify the NASA Cargo Integration Manager to obtain direction.

4.2.3.3 Cargo Turnover Scheduling

The Contractor shall coordinate bag turnover dates with the next level integrator that support cargo element integration schedules. When schedule issues arise that cannot be resolved, the Contractor shall notify the NASA Launch Package Manager to initiate negotiations with the visiting vehicle cargo integration manager.

4.2.4 Cargo De-Integration

4.2.4.1 Return Manifest Disposition Plan

The Contractor shall coordinate with the next level integrator and hardware owners the optimum de-integration and hardware return plans of the pressurized cargo returning on CRS and CxP vehicles, and record the requirements in the flight specific Return Manifest Disposition Plan (RMDP) Appendices (SSP 50465-XXX-XX, where XXX-XX is flight specific). The Contractor shall coordinate early return requirements for utilization hardware with the Stowage Payload Integration Manager. The Contractor shall act as primary point of contact to ISS hardware providers, de-integrators and launch package teams regarding return hardware and de-integration requirements. The Contractor shall develop and provide RMDP flight specific Appendices for Soyuz flights as directed by NASA.

4.2.4.2 Early Destow Requirements

For each CRS and CxP return flight, the Contractor shall review time-critical ground handling requirements*;* JSC 16768, SSP Launch Site Dispositioning Record (LSDR), and SSP 541PP-ANX 1 flight-specific manifest, to ensure ISS hardware early return requirements are documented correctly.

4.2.4.3 Return Manifest Discrepancies

The Contractor shall coordinate resolution of hardware de-integration and return issues for all ISS hardware de-integrated by this contractor and provide discrepancies to the MIC contractor via the RMDP process. The Contractor shall provide a hardware return summary to Mission Integration Operations Control Board (MIOCB) following the completion of return hardware dispositioning.

4.2.5 IMS Bar Code Function

4.2.5.1 Website Updates

The Contractor shall maintain and update the Barcode Inventory Tracking System (BITS) website (currently at http://www.jsc.nasa.gov/ss/issapt/ouipt/BITS.html) as required to support IMS bar code function.

4.2.5.2 Bar Code Label Requests and Waivers

The Contractor shall assist requesters, review for correctness, and approve barcode label requests (JSC Form 733 and JF 1364) in accordance with JSC 27260, Decal Process Document and Catalog. The Contractor shall assist requesters, review for correctness and approve barcode label waivers per JF1345.

4.2.5.3 Bar Code Tracking

The Contractor shall collect and maintain electronic records of hardware to barcode relationships for IMS labels provided by Decal Lab in MIDAS.

4.2.5.4 Bar Code Limited Life Tracking

The Contractor shall track lifetime of unused barcode labels on orbit, determine barcode re-supply needed, coordinate production of re-supply labels, manifest barcode re-supply kit and pack or deliver kit to packing organization.

4.2.5.5.1 MOD Reporting

The Contractor shall provide documentation to the Mission Operations team to support on-orbit tracking of hardware on the ISS.

4.2.5.5.1 As-Built Data Reporting

The Contractor shall document As-Built data in MIDAS database system for hardware packed within the scope of this SOW and deliver reports to MOD for upload to the on-orbit IMS.

4.2.5.5.2 As-Built Data Integration

The Contractor shall coordinate receipt and record As-Built data from other packing organizations into the MIDAS database system and deliver reports to MOD for upload of data by MOD on-orbit IMS.

4.2.5.5.3 Return Stowage Provision Data

The Contractor shall provide return inventory list of stowage provisions (e.g. CTBs, dividers, M-bags) to include bar code label, serial number, part name, and part number for input into the on-orbit IMS as data is acquired during de-integration operations.

4.3 Analytical Stowage Integration

The Contractor shall perform the Stowage Integration (SI) function as described in this SOW for NASA pre-packed bags and specialized stowage accommodations.

4.3.1 Cargo Layout

4.3.1.1 Ascent Cargo Layout

The Contractor shall utilize approved cargo manifests from MIDAS and LPM provided Cargo Priorities Lists (CPLs) to lay out the cargo configuration into cargo transfer bags or specialized stowage accommodations (reference OPS-IDD0-200 for cargo launching on ATV, SSP 50438 and SSP 50273 for cargo launching on HTV). The Contractor shall report results of cargo accommodations assessments to the Launch Package team and provide updates to cargo layouts as requested by the Government. The Contractor shall develop stowage products (DRD for SSCCD

and ECL) to define the stowage arrangement of passive cargo. The Contractor shall verify that all provided hardware packing requirements have been satisfied.

4.3.1.2 Return Cargo Layout

For CRS and CxP flights, the Contractor shall coordinate requirements with the JSC MOD and develop plans for on-orbit packing of cargo for return. Requirements shall be integrated into the return cargo layout as applicable. Requirements that cannot be met shall be coordinated with MOD and the NASA Launch Package Manager for resolution. The Contractor shall provide baseline plans and updates to MOD for implementation.

4.3.1.3 ISS Stowage Location to MIDAS

The Contractor shall provide stowage location data describing the location of ISS cargo items within the CRS and CxP launch vehicles, in an electronic format to the MIDAS system implemented by MIC, utilizing flight specific schedules defined in SSP 50489 or as modified by the flight specific LPT. The Contractor shall provide updates to MIDAS as changes to stowage locations occur.

4.3.2 Cargo Analysis

4.3.2.1 Mass Properties Analysis

The Contractor shall develop, update and deliver mass properties for NASA pre-packs flown on any visiting vehicles to the launch vehicle provider to be used for structural math model development, stowage analysis and integrated safety assessment. Pre-pack mass properties shall include c.g. and moments of inertia if over 30 lbs.

4.3.2.2 Specialized Stowage Accommodations Analysis

The Contractor shall perform stress and loads analysis for specialized stowage accommodations to ensure safe loading of the stowage system (straps, mounting hardware, and fasteners) in the cargo carrier. The Contractor shall support vibration testing and provide procedures for packing, unpacking, ground handling and launch vehicle installation of the stowage system.

4.3.2.3 Integrated Safety Assessment

The Contractor shall perform ground and flight safety assessments for all NASA pre-packs flown on ISS visiting vehicles as defined in paragraph 2.1.2 and (DRD-CMC-SA-06). The safety assessment shall include recommendations and constraints on co-location of NASA pre-packed bags in the respective launch vehicle racks and sub-racks to ensure no damage to hardware contained within the bags.

4.3.3 Mission Operations Support

4.3.3.1 Transfer Lists and Procedure Development

The Contractor shall provide technical assistance and available data to the JSC Mission Operations Directorate (MOD) in the development of transfer lists and procedures for NASA pre-packed cargo transferred to and from the ISS on CRS and CxP vehicles. The Contractor will provide the technical data to JSC MOD for the development of transfer procedures for passive Payload hardware. The Payload Operations and Integration Facility (POIF) will provide the specific transfer procedures for active payload hardware to JSC MOD.

4.3.3.2 On-Orbit Operations Support

The Contractor shall provide on-call support in the ISS Management Center (IMC) during cargo transfer operations for the CRS and CxP mated missions. The Contractor shall provide real-time evaluations of descent cargo configuration changes, including mass properties evaluations and coordination with the visiting vehicle provider for concurrence on hatch closure. On-console operations shall be performed in accordance with the ISS Management Center Operations Handbook (IMCOH).

4.4 Physical Cargo Processing

The Contractor shall perform physical processing of ISS pressurized cargo to the bag level and deliver to the next level integrator.

4.4.1 Facilities Requirements

4.4.1.1 Generally Clean (GC) Facilities

The Contractor shall maintain all Contractor facilities contracted under this SOW, used for processing of flight hardware, as no less than Generally Clean in accordance with SN-C-0005, Contamination Control Requirements.

4.4.1.2 Visibly Clean (VC) Facilities

The Contractor shall provide facility space with Visibly Clean requirements in accordance with SN-C-0005 to accommodate VC hardware requirements.

4.4.1.3 Storage Holding Area

The Contractor shall provide controlled storage holding areas for flight hardware to be used when flight hardware is not being processed.

4.4.2 Hardware Receiving and Inspection

4.4.2.1 Inventory Control

The Contractor shall maintain inventory control by tracking and recording inventory data, on all cargo that is received, stored, or processed under this SOW. The Contractor shall deliver the original ADPs received with all pass thru hardware to TBD for archival in accordance with SSP 30695, Acceptance Data Package Requirements Specification, for cargo and SSP 50431, Space Station Program Requirements for Payloads, for experiments.

4.4.2.2 Inline Hardware Verification Review (HVR)

The Contractor shall perform an HVR for each hardware item as it is received to verify compliance with all ISS hardware requirements. The Contractor shall represent hardware providers (including GFE) when requested by the Government. The Contractor shall document discrepancies to hardware delivered for packing and coordinate with the hardware provider to resolve the discrepancy. Discrepancies that cannot be resolved will be coordinated with the LPT and Mission Integration Contract, including the Manifest Working Group.

The Contractor shall maintain historical metrics on hardware discrepancies and issues in MIDAS, Action Tracking Application (ATA) or Contractor system to provide basis for process analyses and hardware provider evaluations.

4.4.2.3 Contingency Imagery

On an exception basis, if not completed by the hardware provider, the Contractor shall provide imagery of cargo items in accordance with SSP 50502, International Space Station Preflight Imagery Requirements and SSP 50486, Preflight Imagery Requirements for NASA-Provided ISS Government Furnished Equipment. The Contractor shall process imagery products for return from the ISS in accordance with SSP 50521, Return, Processing, Distribution and Archiving of Imagery Products from the International Space Station.

4.4.3 Labeling

4.4.3.1 Labeling Verification

The Contractor shall verify upon receipt of hardware that the flight hardware meets requirements for hardware labeling, as defined in SSP 50005 and SSP 50007.

4.4.3.2 Operations Nomenclature and Toxicology

The Contractor shall coordinate with the Operations Nomenclature (OpNom) group and JSC Toxicology group to ensure that data is available in MIDAS system for contractor to verify OpNom and Hazardous and Toxicity (HazTox) labels are correct as hardware is received.

4.4.3.3 Contingency Labeling

On an exception basis, if hardware is not pre-labeled and the hardware provider cannot label prior to bench review, the Contractor shall apply IMS bar code and nomenclature labels, on the hardware, according to the directions of the hardware provider to complete labeling requirements. If the coordination and application of contingency labeling cannot be completed prior to the required next level integrator need date, the Contractor shall inform the Government.

4.4.3.4 Flight Bag and Tray Labels

The Contractor shall produce flight bag and tray labels for all packed stowage configurations developed by this contractor in accordance with drawing number SEG 32106109 (4 inch Contents Label). The Contractor shall install bag or tray labels in accordance with SSP 50005.

4.4.4 Foam Cutting Services

4.4.4.1 NASA Pre-packed Cargo Foam Cutting

The Contractor shall provide foam-cutting services to manufacture packing provisions for all bags pre-packed on this contract or for any NASA hardware to be launched in non-NASA owned carriers, when requested by the Government.

4.4.4.2 Contracted Services Foam Cutting

The Contractor shall provide foam-cutting services to manufacture packing provisions or mockups for other contractors and IPs, when approved by the Government.

4.4.4.3 Foam Alternatives

The Contractor shall use alternatives to foam for packing ISS pressurized cargo where feasible. Alternatives to foam include but not limited to towels, crew clothing, and dry wipes.

4.4.4.4 Foam Fitchecks

The Contractor shall perform fitchecks of flight ORUs and mockups with specialized stowage accommodations to ensure proper fit and protection of the ORU.

4.4.5 Cargo Packing

4.4.5.1 Flight Hardware Integration

The Contractor shall integrate the flight hardware and stowage provisions per the approved stowage products.

4.4.5.2 As-Built Data

The Contractor shall provide as-built data to the next level integrator during shipment. This data includes as-built lists identifying packed stowage hierarchy, integrated assembly or bag weights (and cg if over 30 lbs), hardware label information, Inventory Management System (IMS) barcode number and serial number information for packed hardware. The Contractor shall provide as-packed bag weights to the MIC for use in submitting a Manifest Request to account for the launched mass of stowage provisions.

4.4.5.3 Fitchecks

The Contractor shall perform internal fit checks of pressurized cargo bags or assemblies to be integrated into launch vehicle racks, using a fit check tool sized to the internal rack dimensions, prior to shipment to next level integrator.

4.4.6 Bench Review

4.4.6.1 Conduct Bench Review

The Contractor shall conduct bench reviews for NASA pre-packed cargo involving Expedition Crew representatives, hardware providers, and MOD representatives in accordance with SSP

50261-01, Generic Ground rules, Requirements and Constraints Part 1: Strategic and Tactical Planning, and SSP 50200-06. The Contractor shall represent hardware providers (including GFE) when requested by the Government.

4.4.6.2 Bench Review Imagery

The Contractor shall provide imagery of cargo items and integrated bags and assemblies prior to or during the bench review in accordance with SSP 50486 and SSP 50502.

4.4.6.3 Crew Squawks and Requests

The Contractor shall document and resolve all issues identified by the Expedition Crew representative(s) at the bench review, prior to shipment of the hardware item(s) involved to the next level integrator.

4.4.6.4 Accommodate Late Delivery

When directed by the Government, the Contractor shall process hardware, including required unique hardware, delivered late to the Contractor's facility, to support the last stowage opportunity (dependent on the carrier type and stowage location).

4.4.7 Hardware Shipment

4.4.7.1 Domestic Shipments

The Contractor shall perform domestic shipments of NASA pre-packs to the Next Level Integrator (NLI) for cargo launching on CRS or CxP vehicles, or shipment of flight hardware to the hardware owners for NASA hardware returning on CRS or CxP vehicles.

4.4.7.2 International Shipments

The Contractor shall perform international shipments of NASA pre-packs to the IP's for cargo launching on their vehicles. The Contractor shall transfer U.S. cargo returned on Soyuz vehicles to hardware owners and perform international shipments of flight hardware returned on CRS or CxP vehicles to IP hardware owners as required. The Contractor is responsible for understanding and developing processes to meet international shipping and customs requirements. International shipping includes development of shipping paperwork, export control paperwork, and customs documentation. Additionally, the Contractor shall act as shipping coordinator for flight hardware delivered to the NLI. As coordinator, the Contractor shall coordinate IP shipping schedules and milestones, pre-coordinate approval of customs paperwork with receiving offices, and resolve issues with customs and handling agents. Issue resolution may include translation services.

4.4.7.3 Shipping Liaison

The Contractor shall provide shipping liaison services at all launch vehicle integration and launch sites for the shipment of NASA pre-packed cargo to the NLI during the time periods that NASA cargo is being shipped for launch vehicle integration. This coordination involves interfacing with customs and the shipping and receiving organization required for efficient shipment and delivery of

NASA cargo. The shipping liaison will perform the function of receiving the cargo shipment including a receiving inspection, and performing the turnover to the next level integrator. For large cargo deliveries, the shipping liaison will direct a team sized to perform the cargo handover activities within the scheduled delivery and turnover window.

4.4.8 Return Cargo Processing

4.4.8.1 De-integration and Disposition of Hardware

For each CRS and CxP flight that returns cargo, the Contractor shall receive, de-integrate, and disposition ISS hardware at the bag and tray level according to the flight specific RMDP Appendices (SSP 50465-XXX-XX, where XXX-XX is flight specific).

4.4.8.2 Non-recoverable Cargo Handling

The Contractor shall plan for and process non-recoverable cargo returned from orbit into the appropriate waste stream.

4.4.8.3 Disposition of Improperly Labeled Cargo

The Contractor shall develop, update, and implement contingency procedures to disposition improperly labeled cargo, containers, and waste. The Contractor shall coordinate with MIC (for waste) in determining the contents of improperly labeled cargo and containers.

4.4.8.4 Decontamination and Cleanup of Spills or Leaks

The Contractor shall develop, update, and implement contingency procedures to clean up and decontaminate spills and leaks that may occur in assigned processing areas.

4.4.8.5 Compliance with Environmental Regulations

The Contractor shall comply with all federal, state, and agency environmental regulations applicable to the handling of non-recoverable cargo.

4.4.8.6 ADP Retrieval for Returned Hardware

The Contractor shall maintain a copy of the flight specific As-Flown RMDP appendix for all ISS flights in order to retrieve original ADPs for return to the hardware provider.

4.5 Decals, Placards and Graphics

The Contractor shall provide flight and non-flight decals, placards, and graphics for NASA's ISS Program, and related research and development programs and spacecraft, including prototypes, mockups, trainers, and engineering mockups. This task includes scheduling, production, and technical and delivery coordination. The Contractor shall proactively provide inputs to JSC 27260 based on changing requirements, lessons learned, improved technology or revised processes.

4.5.1 Compliance with Environmental Regulations

The Contractor shall comply with all federal, state, and agency environmental regulations applicable to the handling and disposal of chemical, toxic, and hazardous waste material.

4.5.2 Flight and Non-flight Decals, Placards and Graphics

The Contractor shall produce flight and non-flight decals, placards, and graphics, for external customers, when authorized by a NASA-approved JSC Form 733, Decal Design and Production Facility (DDPF) Support Request, and released engineering drawing. The Contractor shall be capable of producing all decals, placards and graphics that are described in JSC 27260. The items described in JSC 27260 typically include but are not limited to:

Photosensitive Products Screen Print	**Accron Back Plate**
Gerber Vinyl	Canon Graphics
Merlin Decals	Laser Print
Decal Mounting	Screen Making
Computer Artwork	Nomex
Helioscan	Gerber Edge
Canon Copies	Laminating
Barcode - InterMec Labels	Camera Work
Die Punch	Computer Graphics
Color Anodized Products	Lexan
Metalphoto	

4.5.3 Product Delivery Schedule

Specific end products and deliverables are identified in the specifics of the initiating NASA Form JSC 733. The Contractor shall provide end products and deliverables no later than 30 working days after NASA approval of the initiating NASA Form JSC 733 unless the required delivery date has been negotiated with and approved by the NASA Technical Representative.

4.5.4 Delivery Report

The Contractor shall provide monthly status and tracking reports of all work submitted to the Decal Lab. The reports shall be delivered to the NASA Technical Representative within 15 working days of the end of each month. The reports shall include the submittal request number, requester name and company, job title (drawing name), quantity of products, materials and processes, date submitted, due date, charge number, and status.